

Model 4810

Polarization Extinction Ratio Meter

Unparalleled PER Performance

The 4810 Polarization Extinction Ratio Meter is the first PER meter to allow characterization of devices to over 70 dB. A combination of excellent measurement dynamic range, high-resolution polarization state setability and advanced algorithms support this new capability.

Low Cost

For up to 60 dB PER and using existing polarization controller, the total system cost is quite affordable. A new precision high-speed polarization controller from dBm Optics will be available soon, and this will bring even the highest PER measurement cost down to affordable levels.

Fast Measurement

With the dBm Optics 4810, even the highest PER levels can be measured in just a few minutes. Achieving lower PER further reduces the measurement time. The 4810 can be set up to trade off the measurement time and the guaranteed PER measurement accuracy.

Fully Automatic

There is no software to write—no system integration. Simply connect a device to the 4810 and press “start”—4810 handles everything automatically.

Complete, Fast, Affordable

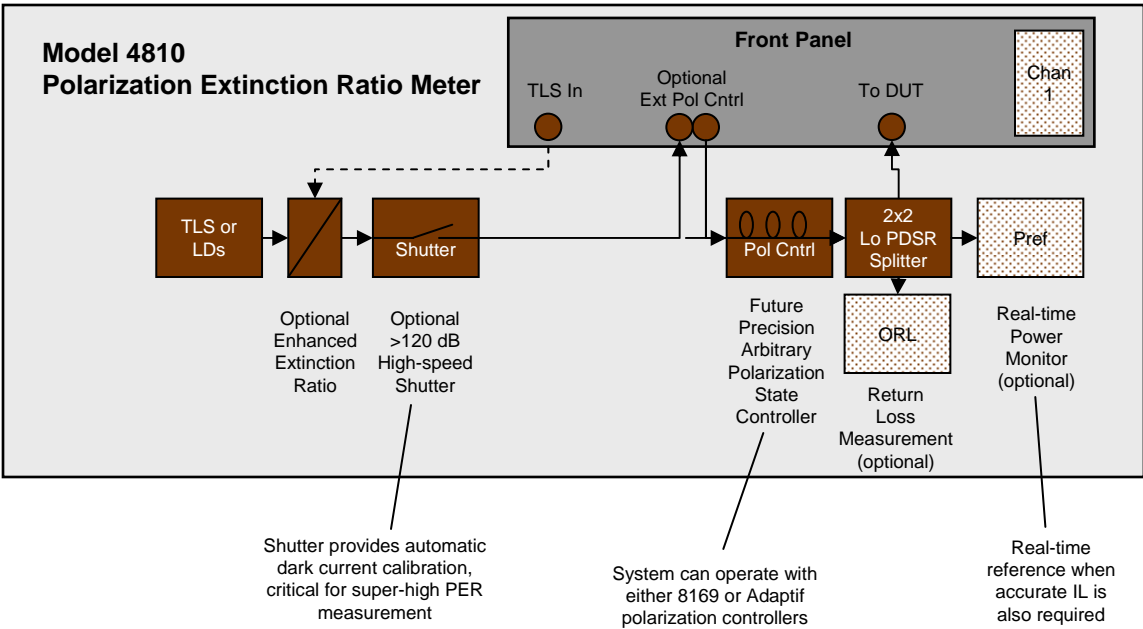
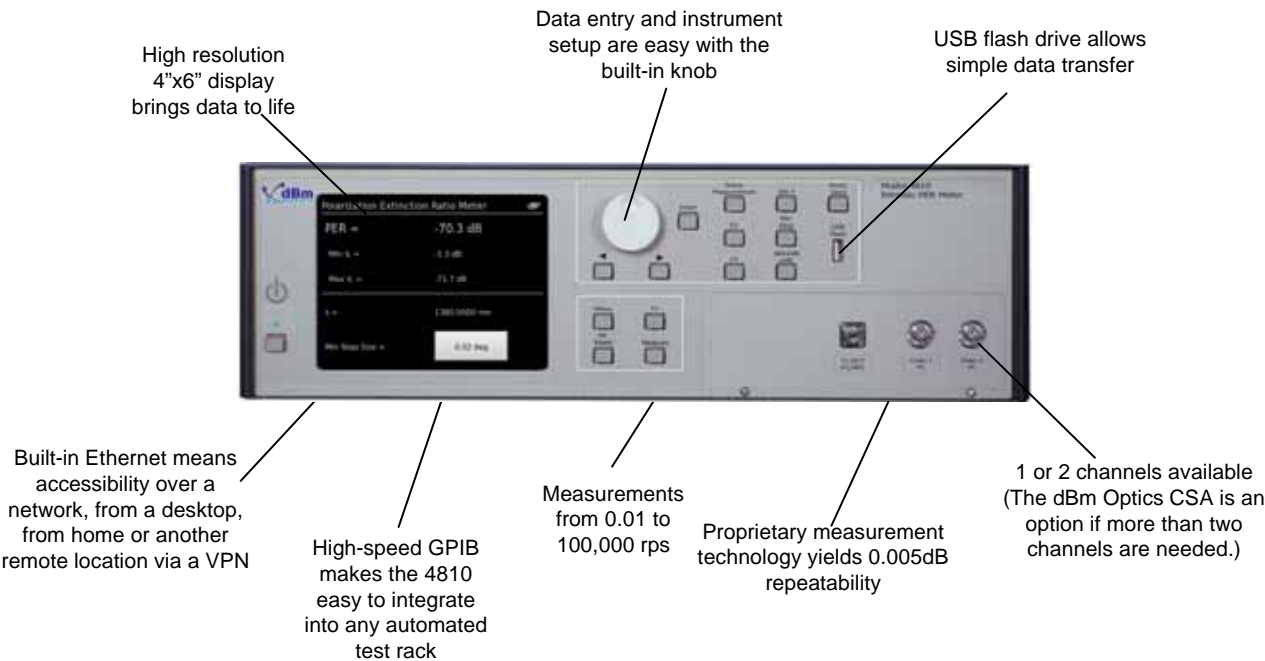


Summary

- Measure Polarization Extinction Ratio up to >70 dB
- Fast Measurement time for PER
 - <40 dB in <1 second
 - <50 dB in <60 seconds
 - <72 dB in <4 minutes
- >100 dB total dynamic range, >65 dB dynamic range at full speed
- Large color display makes data visualization and analysis simple
- Communicate over GPIB or Ethernet
- Exchange data using a USB flash drive
- System can also measure ORL and IL vs. Wavelength
- 4-year warranty

Model 4810 Polarization Extinction Ratio Meter

Overview

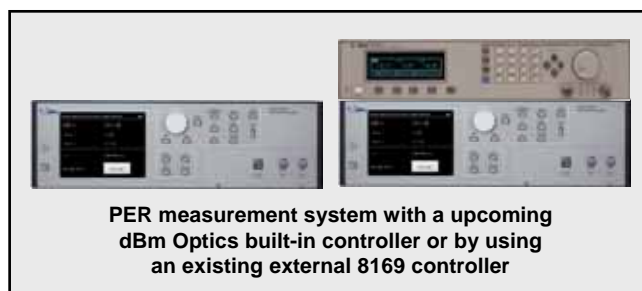


Model 4810 Polarization Extinction Ratio Meter System Configurations

For Moderate-Level Extinction Ratio Applications

If the maximum extinction ratio device to be measured is 55 dB or less, the -953E option for the 4810 can be used. This utilizes the 8169AS external polarization controller. The 4810 controls the 8169 via the rear-panel GPIB controller port that comes with the -953E. The first state sets the polarizer in the 8169 to maximize the power through from the laser source. Then, the 4810 performs an optimized search for the half and quarter waveplates that constitute the 8169 polarization control.

The -958I, a precision high-speed internal polarization controller, will soon be available from dBm Optics. The 958I can be used as a direct replacement for the 953E for PER measurement.



PER measurement system with an upcoming dBm Optics built-in controller or by using an existing external 8169 controller

For Very High-Level Extinction Ratio Applications

If the maximum extinction ratio is above 55 dB (and up to <75 dB), then the system must be configured with either an external Adaptif™ polarization controller (model 100 or model 3000) or with the soon-to-be-released dBm Optics 958I precision high-speed internal polarization controller. When utilizing the Adaptif controller, the dBm Optics 4810 controls the Adaptif via the rear-panel GPIB controller port that comes with the 953E. There is a complex algorithm performed by the dBm Optics 4810 to optimize the search for the single half waveplate and four quarter waveplates that constitute the Adaptif polarization controller. All of the measurement is automated.

Note that the selection of the TLS to be used is critical for high PER applications. The laser power should be high (2 dBm for >68 dB PER) with very low STSE (signal to total spontaneous emission). The STSE spontaneous emission is not a polarized signal, so the STSE places a floor below the best PER measurement possible. The older Agilent™ tunable lasers have a high power output, but the low SSE output is generally only -7 dBm—limiting the measurement to approximately 60 dB. The newer Agilent TLS's are much higher power for low STSE. The New Focus 6500 is ideal for this application.



PER measurement system with an Adaptif multi-stage LiNb polarization controller

Model 4810 Polarization Extinction Ratio Meter

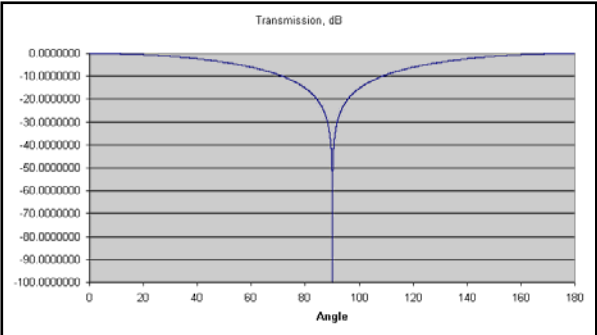
PER Measurement Background

Intrinsic Versus Aligned PER

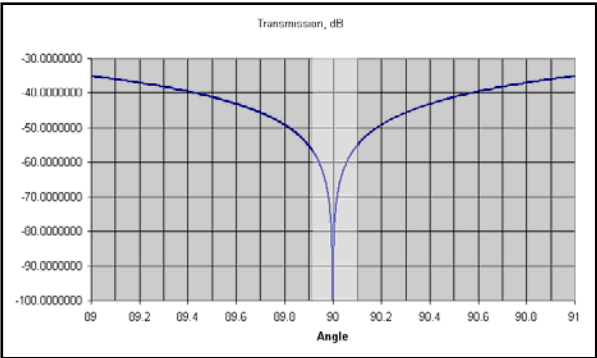
The key performance measure for a raw polarizer device is the polarizer’s intrinsic extinction ratio. Intrinsic PER can be thought of as if the alignment to the device is perfect, then what would the device PER result be? In contract, aligned PER includes the effect of the misalignment of the connector relative to the intrinsic PER. Aligned PER is always lower than intrinsic PER.

Insertion Loss versus Polarization State

The chart below shows how the insertion loss of a polarizer changes with polarization state. The function is a $\cos^2(\theta)$ function.

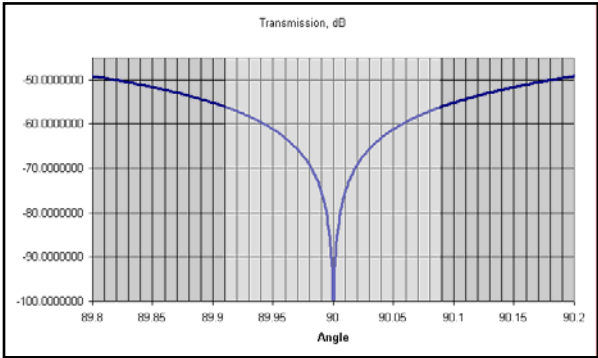


If we zoom in on the narrow well, we can see the very sharp edges of the transfer function.



Angle Resolution and Very High PER

To achieve very high PER, The angle control must be very high to achieve very high PER or the minima of the curve could be missed. If we look closely around the minima, we can see that to achieve -70 dB PER measurement, we need angle resolution at or below 0.02 degrees.



The table below outlines the angle accuracy necessary to achieve various PER levels.

Angle Setability (Degrees on Sphere)	Maximum Extinction Ratio Measurement (Approximate)
0.5 degrees	-40 dB
0.2 degrees	-50 dB
0.1 degrees	-56 dB
0.06 degrees	-60 dB
0.02 degrees	-70 dB
0.005 degrees	-80 dB

Additional Obstacles

There are many other considerations in measuring very high PER. Please contact us for a copy of our application note on measuring high PER.

Model 4810 Polarization Extinction Ratio Meter

Specifications

Channels per mainframe	1 or 2 channels, plus ORL, Pref
Input connections	Selectable from among the following at time of ordering: Model FC: FC/APC or FC/PC; Model SC, Model DN: DIN, Model BF: Bare fiber interface. (Other connectors available upon request.)
Speed per channel	Variable measurement speed from 100K rps to 0.1 rps
System transmit speed	Transmitting to host with Ethernet is 3 Mbytes/sec (dedicated link); with GPIB 1.7 Mbytes/sec into a PC.
Multiple channel speed	100 K rps per channel speed regardless of number of channels.
Trigger latency ¹	<40 nsec
Display	4"x6" graphical display, VGA (800 x 600), TFT LCD color
Data storage	Memory for >100 K readings per channel on all channels real time storage.
Triggering	Software synchronous trigger or two selectable external trigger inputs
Interfaces	IEEE-488, 100-BaseT Ethernet standard
Command set	IEEE-488.2 Compliant (SCPI-like)
Power	90-265 VAC, 175 VA max, 47-63 Hz. No switch or fuse change required.
Ambient temperature	10° C to 35° C (50° F to 95° F). For 0° C to 40° C (32° to 104° F), contact factory.
Storage temperature	-40° C to +70° C (-40° F to 158° F)
Humidity	<95% non-condensing 0° C to 35° C
Warm-up time	60 minutes to full specifications; useable immediately after turn-on
Recalibration period	1 year; certificate of calibration included
Warranty period	4 years
Size	16.8" w x 16.4" d x 5.25" h (42.6 cm x 41 cm x 10.5 cm)
Weight	28 lbs (12.73 kg)
Mounting	Bench top or rack mount

¹ Trigger latency defined as total time from trigger edge to initiation of measurement.

Model 4810 Polarization Extinction Ratio Meter

Ordering Information

Model	Description
4810	1-2 Channel Polarization Extinction Ratio Meter (Standard accessories: USB flash memory card; power cord; user manual)
202	Precision Power Meter Module, 800nm-1700nm
210	Remote Power Meter Module, 800nm-1700nm
222	Precision Power Meter Module, 800nm-1700nm, with Analog Output
301	Real-time Power Reference Module
310	Optical Shutter/Automatic Dark Calibration
501	Bare fiber adapter, low stress, easy alignment
502	Bare fiber-to-FC adapter
680LN	Tunable Laser Source (low noise); 1460-1625nm; Internal
680HP	Tunable Laser Source (high power); 1460-1625nm; Internal
692	Laser Diode Sources, 1-5 sources. Specify 1-5 of the most common sources: 1490 DFB, 1310 FP, 1550 DFB, or any of 1480 DFB, 980 SM, 980 MM Flexcore 5/125, 1490 FP, 1310 DFB, 1550 FP, or any wavelength from 1519 to 1630 nm DFB.
705	Rack ears and slides
706	Swivel handle
740	Internal GPIB controller
750	Add printer port, external keyboard & mouse ports
921	Built-in variable attenuator; 0-20 dB
940	Optical Return Loss (ORL) module
952E	All-states PDL measurement including external polarization sweeper
952I	Automated PDL all-states method and slow speed polarization independent insertion loss method
953E	Matrix Method PDL; external controller
953I	Polarization 4- and 6-state control; internal controller
959	Extinction ratio enhancement (extended PER)

Copyright 2005, 2004, 2003-1998, dBm Optics, Inc. All rights reserved. dBm Optics, Component Spectrum Analyzer, μ -Fine, Real-Time Reference and Beam-Block Shutter and all other dBm Optics product names are trademarks or registered trademarks in the U.S.A. or other countries. All other trademarks mentioned herein are the property of their respective companies. Products described in this catalog may be covered by one or more patents in the U.S.A. and in other countries. Information in this catalog is subject to change without notice.